Network Visualisation and the Impact of Solar Power in Lund

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The increasing digitalisation of measurement data and modern measurement devices enable deeper analysis and better planning of the power distribution network. Meanwhile, the expansion of privately owned solar cells and the customers' desire to produce their own electricity is an inevitable challenge that distribution companies may face in the very near future. The work is about creating a tool to make use of the data in a more meaningful way, one of which is predicting the impact of solar power on a network.

Solar power has great potential to become one of our main electrical energy sources. The technological progress in the field makes owning solar panels cheaper and more convenient than ever before. Power distribution networks however are historically designed for one way delivery of electrical power. With more and more connected customers producing their own energy by installing solar panels of varying size and capacity, the distribution networks have to be prepared. While privately produced energy helps with the loading, it affects the network in a way it is not originally designed for. How do the distribution companies tackle this challenge?

At the same time there is another ongoing change in the distribution network, supported by increased digitalisation and connectivity, which result in significantly more data being available for the development of smarter grids. How do we make use of these above mentioned positive developments to help distribution companies to not only maintain the stability of the changing network dynamics but also encourage the customers to produce even more of their own clean energy?

Our work is about exactly that! With the help of the Qlik Sense analytic platform and network loading data, we created a tool to visualise the strain on a small distribution network in Lund, Sweden. This tool makes it convenient for the distribution companies to have an overview of the customers' energy consumption and production behaviour as well as how prepared they are for future change. The data suggests that the small network in the study has much capacity remaining for load increase but can be put to its limit as the trend continues moving towards more private solar power installations.

Figure 1: Solar panels installed on the rooftop of Kraftringen where the work was carried on.

Another useful function of the developed tool is to help each customer find the limit of how much solar energy they can produce, so they can qualify for tax reduction. The distribution companies can provide this information to their customers and hopefully this economic incentive can encourage them to be solar energy producers but not going overboard and overload the network.